conferenceseries.com

Angeline Poulon Quintin, J Nanomed Nanotechnol 2018, Volume 9
DOI: 10.4172/2157-7439-C6-082

Innovative fast supercritical fluids synthesis of thermoelectric $CoSb_3$ nanoparticles

Angeline Poulon Quintin[1,2]
[1]Institute of Chemistry of Condensed Matter of Bordeaux, France
[2]University of Bordeaux, France

Thermoelectric (TE) materials have received a lot of interest for decades for power generation applications in waste heat recovery or energy harvesting by conversion of waste thermal energy into useful electricity. The performance of TE devices depends on the dimensionless figure of merit $ZT=(\alpha^2\sigma/\kappa)\,T$, where α is the Seebeck coefficient, σ and κ the electrical and thermal conductivities, respectively and T is the absolute temperature. Many TE materials have been developed such as Bi_2Te_3, PbTe, Mg_2Si, Zn_4Sb_3, filled skutterudites and SiGe. Among them, skutterudite compounds MX_3 (M=Co, Rh or Ir; X=P, As or Sb) crystalized in the bcc structure Im3 are promising TE materials. The binary skutterudite CoSb3 exhibits a large Seebeck coefficient and a high electrical conductivity. However, its high thermal conductivity makes it difficult to be an efficient TE material. Nanostructuration is an effective approach to lower thermal conductivity. While physical methods allow high purity microparticles synthesis, solution routes are the most effective methods to produce $CoSb_3$ nanoparticles with a few nanometer size and have advantages of low cost, low processing temperature (<300 °C) and high reproducibility, allowing possible large-scale production, even if they suffer from long reaction time, multiple reaction steps and impurity presence. Supercritical fluid routes have emerged from the two last decades as novel efficient approaches to synthetize metal nanoparticles with the control of their physicochemical properties as size, morphology, crystallographic structure and composition. We report the first fast and continuous supercritical fluids synthesis of cobalt antimony intermetallic nanoparticles (4-5 nm) with a high reliability.

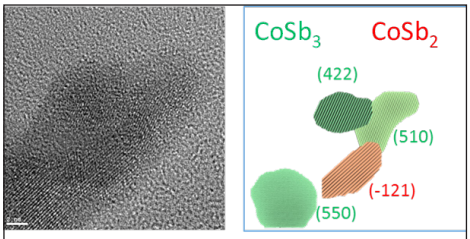

Fig 1. HR-TEM image of cobalt antimony nanoparticles synthetized and their composition and orientation after mathematical treatment.

Recent Publications

1. S Allain, S Gaudez, G Geandier, J C Hell, M Gouné, F Danoix, M Soler, S Aoued and A Poulon Quintin (2018) Internal stresses and carbon enrichment in austenite of quenching and partitioning steels from high energy X-Ray diffraction experiments. *Materials Science and Engineering A*; 710: 245-250.
2. F Balima, F Bellin, D Michau, O Viraphong, A Poulon Quintin, U C Chung, A Dourfaye and A Largeteau (2018) High pressure pulsed electric current activated belt type (HP-SPS) for material processing. *Materials and Design*; 139: 541-548.

Biography

Angeline Poulon Quintin is an Associate Professor at the University of Bordeaux and ICMCB. She has a long experience in the correlation between process parameters, microstructure and properties of structural and functional materials. Her current interests range from the search for innovative multifunctional coatings to the development of green processes to elaborate intermetallic compounds for applications in energy, aerospace and aeronautical industries. She is a Specialist in fine characterization with an extended recognized experience in electronic microscopy and physico-chemical techniques. She has co-authored 31 peer-reviewed articles, 37 oral presentations, 12 invited conferences and 4 patents.

angeline.poulon@icmcb.cnrs.fr

Notes: